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Gender Wage Differentials in Brazil:

Trends over a Turbulent Era

G. Reza Arabsheibani,* Francisco Galrão Carneiro,† and Andrew Henley*

Abstract

Macroeconomic and trade reform in Brazil since the late 1980s appears to have been accompanied by a substantial improvement in position of women relative to men in the labor market, despite only modest changes to labor market institutions. This paper examines movements in the gender wage gap over this period. The results indicate that, over the period 1988-98, the gender wage gap has fallen mainly due to reduced discrimination against women. However, evidence is found to suggest that more recently, since the elimination of high inflation, the human capital and other earnings improving endowments of women have begun to improve.

Keywords: Earnings, Discrimination, Inequality

JEL Classification: J16, J71, O15

* School of Management and Business, University of Wales Aberystwyth, UK.
† Poverty Reduction and Economic Management (PREM), The World Bank.

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I. Introduction

Since the late 1980s Brazil has undergone a process of substantial economic reform, initially through financial and trade liberalization, and since 1994 as a result of macroeconomic stabilization. At the beginning of this process Brazil inherited one of the worst levels of earnings inequality of any country in the world. The development of appropriate policy responses to this problem has been a major concern of economists and policy makers alike. Financial and trade reform alongside the elimination of triple and quadruple digit annual inflation have had potentially profound effects on the labor market. However, direct reforms of labor market institutions, although proposed and extensively debated, have been rather modest to date, and in some instances might be regarded as retrograde.[1] Consequently some research suggests that the overall impact on earnings inequality in Brazil has been modest.[2] However the last fifteen years have witnessed major changes in the labor market opportunities and experience of women relative to men, as evidenced in the growth of the female economic activity rate from 43.3% of those aged 15 and over in 1988 to 54.4% in 1999.[3]

The existence and persistence of an earnings gap between men and women has been a subject of great interest to economists. Since seminal papers by Oaxaca and Blinder hundreds of papers have been written about wage differentials in general, and male-

female wage differentials in particular, using the Oaxaca-Blinder decomposition technique.[4] The objective of this work has been to further understanding of the raw gender wage differential, which universally shows that men are paid more than women, and try to account for the possibility that men, on average, may be endowed to a greater extent with characteristics that are rewarded in the labor market. The remaining unexplained component is then usually interpreted as the upper bound of discrimination against women.

Has economic reform and stabilization helped women to improve their relative position in the Brazilian labor market, and so made a positive contribution to the reduction of inequality? This paper argues that this has indeed been the case, and shows that women have benefited because their endowments of human capital characteristics have improved and the degree of discrimination in the returns that women receive for those characteristics relative to men has been reduced. Most importantly women have benefited because their average position in the earnings distribution relative to men has improved.

We reach these conclusions on the basis of analysis of large scale household survey data. Brazil is unusual among developing countries in that it has a long tradition of collecting labor market data through such surveys. The Instituto Brasileiro de Geografia e Estastistica (The Brazilian Institute of Geography and Statistics) has been collecting the Pesquisa Nacional por Amostra de Domicilios, PNAD, since 1976. The data is available for each year except the census years of 1980 and 1990 and for 1994, when for budgetary

reasons the survey was not conducted. The PNAD is a nationally representative household survey using a consistent sampling methodology.

We present an analysis of how the gender differential has evolved over time, through the turbulent period of 1988 to 1998 during which Brazil undertook its program of stabilization and economic liberalization. We do this by applying the Juhn, Murphy and Pierce decomposition analysis (henceforth JMP) that expands the Blinder-Oaxaca decomposition to take account of distributional changes over time.[5] As far as we know, this is the first time that this methodology has been applied to data for a developing country to assess changes in the scale and determinants of gender wage discrimination.

The paper is structured as follows. Following this introduction, section II reviews the existing literature on the gender wage differential in Brazil, section III outlines the decomposition methodology used and describes the data source, section IV presents our empirical findings and section V concludes.

II. Gender discrimination in Brazil: a review of existing literature

The first studies on gender and the pay gap in Brazil date back to the mid-1980s.[6] Camargo and Serrano used data from the Labor Ministry's survey of the formal labor market (Relação Anual de Informações Sociais – RAIS) for 1976 to estimate gender wage gaps for 22 sectors of Brazilian manufacturing. Their results suggested that education was the most important variable in the determination of wages for female

workers as compared to males, while industry sector affiliation was the most important variable in the determination of wages for male workers.

In the other pioneering study from this time, Birdsall and Fox investigated male-female earnings among school- teachers. Using the 1% sample of the 1970 census they showed that the mean income of female teachers is less that one half of that of male teachers. Using the male earnings regression as a base, 81% of the differential was attributed to individual characteristics and 10% to discrimination. Nearly 8% of the differential was due to location since males tend to be concentrated more in higher paying geographical areas.

In a further study Birdsall and Behrman used the same data source and estimated wage equations for male and females in urban Brazil. On average men earned about twice that which women earned. The decomposition results indicated that elimination of discrimination might raise the (ln) earnings of females by 22% in the formal sector, 72% in the informal sector, 44% in the domestic sector and 31% overall.

A World Bank sponsored research program on women's employment and pay in Latin America provides two additional case studies on gender earnings differentials in Brazil.[7] In the first study Stelcner et. al. used a 3% sample of the 1980 Brazilian census containing 3.5 million individuals.[8] They extracted a sub-sample of 200,000 individuals and using the Oaxaca decomposition their research offers the following insights. The national wage gap measured by comparing husband and wives was 29%. The

decomposition revealed that the endowment component favored wives by 70% whilst husbands had a coefficients advantage of 170%. A similar pattern emerged when self-employed workers were considered. In the case of single workers the national wage gap was only 18% but the decomposition revealed that 21% of the differential was not explained by endowment differences. However, there seemed to be a regional difference, namely that in the Northeast, women not only had an earnings advantage but also a coefficient advantage in the decomposition.

In the second case study Tiefenthaler used PNAD 1989 and estimated male and female earnings functions in three sectors: formal employment, informal employment and self-employment.[9] Ratios of married female to male earnings in each sector were 0.7, 0.85 and 0.7 respectively. Ratios for single women were almost identical. The decomposition analysis revealed that, depending on specification of the model, between 81-89% of the earnings differential of men versus women in the formal sector, 72-75% in the informal sector and 83-84% in the self-employment sector could be attributed to the structure of rewards. Thus, Tiefenthaler concluded that discrimination played a more important role in explaining male-female wage differentials in Brazil in 1989 than differences in characteristics.

More recently, Loureiro and Carneiro investigated the existence of discrimination in the urban and rural labor markets in Brazil.[10] The authors used the Blinder-Oaxaca decomposition analysis on data from the 1998 PNAD and concluded that there are substantial wage differentials between men and women by gender and race.

Leme and Wajnman presented a comprehensive review of the main results as regards the gender wage gap studies for the case of Brazil and pointed to the narrowing of wage differentials between men and women over the period 1977 to 1997 from 70% to just 25%.[11] This result, the authors claimed, is in line with a worldwide trend in gender wage gaps. In their paper, the authors used information on cohorts borne in 1952 and 1962 to identify the determinants of the narrower gender wage differentials over the period 1977 to 1997 in Brazil. Their results, based on the standard Oaxaca decomposition, suggested that some 17% of the male-female wage differential were eliminated over this period because of reduced discrimination against women.

Evaluating and comparing the existing studies is difficult because they use different data sets and different specifications for the earnings function. However, it is clear that when we look at a single occupation, particularly an occupation such as teaching where public sector employment is very significant, then the finding that over 80% of the wage differential is attributed to endowment differences is not surprising. On the other hand when nationally representative samples for all the labor force are used, at least for the 1980s, up to three-quarters of the gender wage differential remains unexplained. This might be taken as an upper bound for the extent of discrimination against females in Brazil. But, as noted, the most recent research has suggested that the degree of discrimination may be declining. This is an important suggestion which merits further investigation.

III. Earnings decomposition method and data source

The standard Oaxaca decomposition of the wage gap between men and women can be written as:

$$D = \overline{\ln W}_m - \overline{\ln W}_f = \left(\overline{X}_m - \overline{X}_f\right)\hat{\beta}_m + \overline{X}_f(\hat{\beta}_m - \hat{\beta}_f) \quad (1)$$

where D is the difference between the mean log male hourly wage, $\overline{\ln W}_m$, and that of the female log hourly wage, $\overline{\ln W}_f$. $\overline{X}_m$ and $\overline{X}_f$ are vectors of mean male and female characteristics respectively and $\hat{\beta}_m, \hat{\beta}_f$ are their corresponding vectors of estimated coefficients. The first term of the decomposition shows the difference due to observable characteristics and the second term represents the difference in earnings' generating functions, or prices. It is this term that is usually interpreted as a measure of discrimination.

The estimated processes determining male and female wages, for an individual worker *i*, can be expressed as:

$$\ln W_{mi} = X_{mi}\hat{\beta}_m + \hat{\sigma}_m\theta_{mi} \quad (2)$$

and

$$\ln W_{fi} = X_{fi}\hat{\beta}_f + \hat{\sigma}_f\theta_{fi} \quad (3)$$

where $\hat{\sigma}_m, \hat{\sigma}_f$ are the estimated standard deviations of the residual of the wage regression for each gender and $\theta_{ji} \sim [0,1], j = m, f$ are the standardized residuals of in each wage

regression. In other words $\theta_{ji} = e_{ji} / \hat{\sigma}_j$, e_{ji} being the residual for individual *i* from the wage regression for gender *j*. Juhn, Murphy and Pierce argue that the advantage of using equations 2 and 3 is that they can express the wage equations in a form that shows the position that an individual occupies in the residual distribution, as well as the spread of the residual distribution itself.

Using this property JMP expand the simple decomposition to take account of distributional changes over time. Rewriting the gap, and introducing a specific subscript, *t*, for the year of interest, we obtain:

$$D_t = \overline{\ln W}_{mt} - \overline{\ln W}_{ft} = \left(\overline{X}_{mt} - \overline{X}_{ft}\right)\hat{\beta}_{mt} + \overline{\Delta\theta}_t \hat{\sigma}_{mt} \tag{4}$$

The first term in this equation is the same as equation 1. The second term needs further explanation. $\overline{\Delta\theta}_t$ is the mean difference between the standardized residual for a sampled individual with particular characteristics predicted from the male earnings equation and that predicted from the female earnings equation. This is in turn weighted by the estimated male residual inequality, $\hat{\sigma}_{mt}$.

The change in the male-female wage gap between two different years, *t*-1 and *t*, can now be expressed as:

$$\begin{aligned} D_t - D_{t-1} = & \left[\left(\overline{X}_{mt} - \overline{X}_{mt-1}\right) - \left(\overline{X}_{ft} - \overline{X}_{ft-1}\right)\right]\hat{\beta}_{mt} \\ & + \left(\overline{X}_{mt-1} - \overline{X}_{ft-1}\right)\left(\hat{\beta}_{mt} - \hat{\beta}_{mt-1}\right) \\ & + \left[\overline{\Delta\theta}_t - \overline{\Delta\theta}_{t-1}\right]\hat{\sigma}_{mt} \\ & + \left(\overline{\Delta\theta}_{t-1}\right)\left(\hat{\sigma}_{mt} - \hat{\sigma}_{mt-1}\right) \end{aligned} \tag{5}$$

JMP refer to the first term as the "observed-X's" effect. This term reflects the change in the gender wage gap resulting from changes in the earnings generating characteristics, for example educational qualifications, over time. The second term is the "observed prices" effect and measures changes in the prices of the observed earnings generating characteristics of men. A change in the return to an educational qualification would serve as an example of this kind. The third term is the "gap effect" and measures the effect of the changing differences in the relative position of women in the male wage distribution. In other words it captures what would happen if the residual male inequality were to be held constant but the percentile ranking of the female wage residual changed. In general, females would move up this distribution if they were faced with less discrimination over the two periods or if they improved their unobserved (to the researcher) characteristics that are nevertheless rewarded in the labor market. The final term is the "unobserved prices" effect and measures the change in the gender wage gap attributable to the change in the spread of the male wage function holding constant the gap in male-female unmeasured endowments. In other words it gives the contribution to the change in the gender gap between t-1 and t that would result if the percentile ranking of the female wage distribution stayed the same but the male residual distribution changed.

The data used in this paper is drawn from the 1988, 1992 and 1998 PNADs, and we will report the decomposition for changes between 1988 and 1992 and 1992 and 1998, as well as for both sub-periods combined. The purpose of looking at these two sub-periods is to investigate the impact of the period of concentrated trade and financial liberalization

between 1988 and 1992, and then to investigate the subsequent impact of macroeconomic (price) stabilization which took place following the introduction of the Real Plan in 1994, and was largely completed by the end of the first Cardoso presidential term in 1998.

All members of each participating household over the age of ten are asked a series of detailed questions about their labor market activities as well as personal characteristics such as the level of education. The survey takes place during one week in September. The sample size is 69066 households in 1988, 94171 in 1992 and 112434 in 1998. In our analysis we only include individuals between the age of 18 and 65, who also report all other important information necessary such as education, earnings and so on. The total sample used therefore is 100044 (65002 males and 35042 females) for 1988, 106722 (68102 males and 38620 females) and 120176 (74378 males and 45798 females). The male-female split in the samples is thus two-thirds to one-third in favor of males.

The real hourly wage (constant in 1998 consumer prices) variable is calculated by dividing the reported monthly wage by $4.33H$ where H is the reported weekly hours of work. Our wage regressions include the covariates to capture the following: experience, schooling, region, urban/metropolitan location, race, industry and informal status (lack of a signed labor card). The means and standard deviation of the variables are given in Table 1.

The experience variable is the conventional Mincerian approximation where experience = age - years of schooling - 6. The educational status of both sexes in Brazil has improved

between 1988 and 1998. Approximately 47% of males had no education or education only to elementary level in 1988. This proportion fell to about 26% in 1998. For the females this proportion fell from around 35% to about 20%. At the same time both sexes improve their qualification in all other levels (primary, secondary and university). Years of experience fell by about 1 year for men and 0.7 for women during this period. This finding is consistent with the rising educational levels of the work force. Most other variables are stable over the three years. The exception is the proportion of the sample resident in a non-metropolitan urban area. The proportion of males in urban areas falls from 48% to 44% but that of females rose from 40 to 45.5%.

However, there are gender differences in employment variables. 30.6% of men worked in the secondary sector (manufacturing and construction) in 1988 compared to 12.7% of women. 44.3% of men worked in the service sector (including government) compared to 78.8% of women. In 1998 about 30% of men worked in the secondary sector and 51% in the service sector. The corresponding numbers for women are 10.7% and 84%. The pattern, therefore, indicates a movement out of agriculture into services for men and out of both agriculture and production into services for women.

Mean real hourly wage rises consistently for women over the period. Men experience a fall from 1988 to 1992 and a rise from 1992 to 1998. Female wages rise approximately by 300% between 1988 and 1998. Male wage growth for the same period is only 33%. The male-female log wage ratio declines significantly between the two periods from 3.972 in 1988 to 2.625 in 1992 and 1.326 in 1998. These figures imply that men had a 299%

advantage in hourly earnings in 1988, a 162% advantage in 1992 but only a 33% advantage in 1998. This shows very clearly that the female real hourly wage has converged very quickly with that of males.

Improvement in women's wage relative to that of men could be caused by a number of factors. These include changes in the relative distribution of wages, improvements in female earnings generating endowments and/or a successful anti-discrimination policy providing more equal opportunities for women. In the next section we attempt to shed more light on the relative strengths of these factors.

IV. Empirical results

Table 2 presents estimated earnings functions by gender for each of the three years. All functions are well specified and the explanatory power of the regressions ranges from 0.49 to 0.55. Returns to educational qualification are statistically significant and rise by the level of education. They are also very similar for both sexes. For example in 1988 a male with a postgraduate qualification earned $100(e^{2.77}-1) = 1495\%$ more than someone with no qualifications. The corresponding figure for a female was 1233%. An interesting pattern on educational returns is the fall between 1988 and 1998. A postgraduate qualification only yields 917% return for men and 767% for women in 1998. This pattern, observed for all levels and for both men and women, is consistent with rising educational qualification of Brazilians leading to a fall in the returns to qualification.

The race variables indicate that whites earn more than other races. Black men earn 22% less than whites and men of mixed race earn 20% less than whites in 1988.[12] In the case of women blacks earn 16.5% less and those of mixed race 15% less than whites. The results for 1998 show an almost identical pattern. It seems that during this period racial inequality, very crudely speaking, has not narrowed. It also seems that there is less of a racial pay differential among women than there is among men.

The impact of other variables in the wage functions is as expected. The wage-experience profiles have the conventional shape; those without a signed labor card earn less than those with a signed labor card and individuals employed in the government sector and men in production industries tend to earn more.

Region dummies indicate that there are regional wage inequalities in Brazil. The South East, containing the high labor demand metropolitan areas of Rio de Janeiro and São Paulo, tends to be the region with the highest average wage. The North and North East are the regions with the lowest average wage. Those working in the North East region earn less than any other region in Brazil.

Industry dummies suggest that there are important wage differentials per activity sectors in Brazil. Workers attached to manufacturing and related activities (e.g., other production, transports and communications) tend to earn more than in any other sector. The female earnings disadvantage in most sectors has declined over time in line with the results for the other variables shown in Table 2.

The results for the JMP decomposition are presented in Table 3. The third row indicates that the total change in the wage gap between 1988 and 1998 is -0.1883 log points, which indicates a considerable narrowing of the gender wage gap over the period. Most of this narrowing is due to the "gap effect" or the change in the position of women in male wage distribution. This constitutes 66.9% of the total change. It seems that females have either improved their unobserved earnings generating endowments over this period or discrimination against women has fallen. The true picture is probably a combination of the two but we cannot separate each individual effect. The sum of the effect of observed improvement in women's endowments and observed and unobserved prices in narrowing the gender gap is 33.1%. However, every component of the JMP decomposition is negative implying that they all contribute to the narrowing of the wage gap. Women have experienced an improvement in observable endowments and in the returns to those endowments. At the same time residual inequality has fallen.

The picture changes somewhat when we examine the two sub-periods. In the first period (1988-1992), shown in the first row, the overall change in the wage gap indicates a narrowing of 0.1026 log points. The "gap effect" is the most important component, and is able to explain nearly all of this narrowing. The "observed X's" effect is positive indicating that the endowment of females deteriorated relative to males in this period. During the second period (1992 to 1998), shown in the second row, there is a catching up in both endowments ("observed X's") and in the return to those endowments ("observed prices"), as shown in columns 3 and 4. These two combined contribute 56.5% to the

narrowing of the wage gap in this period, with the catch-up effect of improved prices for female characteristics the most important contributory factor. Finally and importantly residual inequality ("unobserved prices") falls in both sub-periods.

V: Conclusions

Economic reform in Brazil over the last fifteen years has had to address a number of serious structural challenges. The design of appropriate policies to reduce earnings inequality has been an important consideration through this process. One key aspect of inequality in Brazil concerns the disparity in the pay of men and women. At the end of the 1980s on average men were paid 300% more per hour than women. Ten years later this gap has narrowed to 33%. This is a considerable achievement. However, it is one that appears to have been achieved as an indirect rather than a direct consequence of policy reform, in the sense that it has followed from greater economic liberalization and from price stabilization rather than from substantial changes in employment law.

This paper has aimed to cast light on this change. With one exception, previous studies of the gender wage gap in Brazil all find that a substantial part of the gender wage differential is not explained and hence attribute that to discrimination against females. Our results show that reductions in residual inequality, improvements in observable endowments (at least since 1992) and in returns to those endowments have all contributed positively to the reduction of the gap. However, it is the possible improvement in the unobservable endowment, for example quality of education, and/or reduction in

discrimination per se which is the major cause of the falling gender wage gap. Most of this change has occurred between 1988 and 1992, partially canceling out the adverse effect of deteriorating endowments for women relative to men in that period. While successive Brazilian administrations attempted various abortive attempts to stabilize crippling levels of inflation at this time, the main sustained policy change concerned trade liberalization. Changes in the real level of earnings of men compared to women are consistent with trade liberalization introducing significantly greater competition for "male" jobs than for "female" ones. Women faired relatively better, because men experienced more severe downward pressure on real wage levels. Since 1992 the major contributor to the narrowing of the gender wage gap has been the improvement in the returns to the endowments of women. This offers greater grounds for optimism, since it suggests that Brazil has, since macroeconomic stabilization, entered an era during which the absolute rather than the relative position of women in the labor market has begun to improve.

Notes:

[1] For example the four-fold increase in the cost of redundancy imposed on employers through the new constitution of 1988 might be taken in this regard.

[2] For example, Green, F., Arbache, J.S. and Dickerson, A., "A Picture of Wage inequality and the Allocation of Labor Through a Period of Trade Liberalization: the Case of Brazil.", *World Development*, 29(11) (2001), 1923-1940.

[3] Source: International Labour Office.

[4] Oaxaca, R., "Male-Female Wage Differentials in Urban Labour Markets", *International Economic Review*, 14 (1973): 693-709; Blinder, A. "Wage Discrimination: Reduced Form and Structural Estimates", *Journal of Human Resources*, 8 (1973): 436-455.

[5] Juhn, C., Murphy, K. and Pierce, B. "Accounting for the Slowdown in Black-White Wage Convergence", in M. H. Kosters. (ed.) *Workers and their Wages* (Washington: AEI Press), (1991): 107-43.

[6] See, *inter alia*, Camargo, J.M. and Serrano, F. (1983) "Os Dois Mercados: Homens e Mulheres na Indústria Brasileira", *Revista Brasileira de Economia*, 34 (1983); Birdsall, J. and Fox, L. M. "Why Males Earn More: Location and Training of Brazilian School Teachers", *Economic Development and Cultural Change*, 33 (1985): 55-72; Birdsall, N. and Behrman, J. R. "Why Do Males Earn More Than Females in Urban Brazil: Earnings Discrimination or Job Discrimination?" in Birdsall, N. and Sabot, R. (eds.) *Unfair Advantage: Labor Market Discrimination in Developing Countries*, (Washington: World Bank) (1991): 147-70. A recent survey of a number of studies of the Brazilian gender

differential is contained in Coelho, A.M. and Corseuil, C.H. "Diferenciais Salariais no Brasil: Um Breve Panorama", *Discussion Paper*, No. 898, IPEA, Rio de Janeiro (August 2002).

[7] Psacharopoulos, G. and Tzannatos, Z. (eds.) *Case Studies on Women's Employment and Pay in Latin America*, (Washington: World Bank) (1992).

[8] Stelcner, M., Smith, J. B., Breslaw, J. A. and Monette, G. (1992) "Labor Force Behavior and Earnings of Brazilian Women and Men, 1980", in Psacharopoulos, G. and Tzannatos, Z. (eds.) *Case Studies on Women's Employment and Pay in Latin America* (Washington: World Bank) (1992): 39-88.

[9] Tiefenthaler, J. "Female Labor Force Participation and Wage Determination in Brazil, 1989" in Psacharopoulos, G. and Tzannatos, Z. (eds.) *Case Studies on Women's Employment and Pay in Latin America* (Washington: World Bank) (1992): 89-118.

[10] Loureiro, P.R.A. and Carneiro, F.G. "Discriminação no Mercado de Trabalho: Uma Análise dos Setores Rural e Urbano no Brasil", *Brazilian Journal of Applied Economics*, 5 (2001): 519-545. Using a different data set Kassouf also finds similar results. See: Kassouf, A.L. "Retornos à Escolaridade e ao Treinamento nos Setores Urbano e Rural", *Revista de Economia e Sociologia Rural*, 35 (1997): 59-76.

[11] Leme, M.C.S. and Wajnman, S. "Tendências de Coorte nos Diferenciais de Rendimento por Sexo" in Henriques, R. (ed.) *Desigualdade e Pobreza no Brasil*, IPEA, Rio de Janeiro (2000). A similar conclusion is drawn by Barros, R.P. de, Ramos, L. and Santos, E. "Gender Differences in the Brazilian Labour Market", in Schultz, P.T., *Investments in Women's Human Capital* (Chicago: Chicago University Press) (1995).

[12] Black in this case includes a small number of indigenous people and white includes a small number of people classified as yellow in the survey. Preliminary results suggested that the data accepted this pooling.

Table 1: Means and Standard Deviations by Gender 1988, 1992 and 1998.

	1988		1992		1998	
Variable:	Men	Women	Men	Women	Men	Women
Log real hourly wage	0.4476	0.1127	0.3754	0.1430	0.5964	0.4497
	(1.09)	(1.13)	(1.01)	(1.04)	(1.00)	(0.97)
Educational attainment						
(reference - illiterate):						
Elementary	0.2984	0.2428	0.2696	0.2237	0.1834	0.1475
	(0.0018)	(0.0023)	(0.0017)	(0.0021)	(0.0014)	(0.0017)
Primary	0.2904	0.2611	0.3629	0.3107	0.4141	0.3402
	(0.0018)	(0.0023)	(0.0018)	(0.0023)	(0.0018)	(0.0022)
Secondary	0.1536	0.2327	0.1716	0.2399	0.2260	0.2981
	(0.0014)	(0.0022)	(0.0014)	(0.0023)	(0.0015)	(0.0021)
Degree	0.0849	0.1366	0.0797	0.1388	0.0903	0.1510
	(0.0011)	(0.0018)	(0.0010)	(0.0018)	(0.0010)	(0.0017)
Postgraduate	0.0020	0.0033	0.0037	0.0050	0.0062	0.0088
	(0.0002)	(0.0003)	(0.0002)	(0.0004)	(0.0003)	(0.0004)
Experience	23.8385	21.0774	22.8830	20.4198	22.7851	20.4460
	(13.65)	(13.17)	(13.29)	(12.90)	(13.23)	(12.69)
Experience squared	754.6963	617.8005	700.8608	583.9870	693.3549	579.1761
	(775.91)	(694.18)	(735.50)	(660.73)	(714.67)	(630.80)
Region						
(reference - South East)						
North	0.0819	0.0903	0.0649	0.0668	0.0709	0.0734
	(0.0010)	(0.0015)	(0.0009)	(0.0013)	(0.0009)	(0.0012)
Centre West	0.1290	0.1137	0.1138	0.1104	0.1173	0.1151
	(0.0013)	(0.0017)	(0.0012)	(0.0016)	(0.0013)	(0.0015)
South	0.1612	0.1604	0.1860	0.1851	0.1846	0.1809
	(0.0014)	(0.0020)	(0.0015)	(0.0020)	(0.0014)	(0.0018)
North East	0.2855	0.2874	0.2696	0.2721	0.2816	0.2814
	(0.0018)	(0.0024)	(0.0017)	(.0023)	(0.0016)	(0.0021)
Urban/rural						
(reference - rural):						
Metropolitan	0.4067	0.4934	0.3975	0.4633	0.3976	0.4650
	(0.0019)	(0.0027)	(0.0019)	(0.0025)	(0.0018)	(0.0023)
Urban	0.4884	0.4042	0.4299	0.4880	0.4404	0.4545
	(0.0020)	(0.0026)	(0.0019)	(0.0025)	(0.0018)	(0.0023)

Race						
(reference - white):						
Black and Indigenous	0.0545	0.0635	0.0586	0.0614	0.0623	0.0662
	(0.0009)	(0.0013)	(0.0009)	(0.0012)	(0.0009)	(0.0012)
Mixed Race	0.4168	0.4000	0.4059	0.3821	0.4096	0.3819
	(0.0019)	(0.0026)	(0.0019)	(0.0025)	(0.0018)	(0.0023)
Industry						
(reference - agriculture):						
Manufacturing	0.1690	0.1141	0.1611	0.1077	0.1470	0.0928
	(0.0015)	(0.0017)	(0.0014)	(0.0016)	(0.0013)	(0.0013)
Construction	0.1077	0.0061	0.1142	0.0046	0.1288	0.0071
	(0.0012)	(0.0004)	(0.0012)	(0.0003)	(0.0015)	(0.0004)
Other Secondary	0.0291	0.0066	0.0238	0.0077	0.0196	0.0068
	(0.0007)	(0.0004)	(0.0006)	(0.0004)	(0.0005)	(0.0004)
Retail	0.1252	0.1278	0.1363	0.1335	0.1418	0.1492
	(0.0013)	(0.0018)	(0.0013)	(0.0017)	(0.0013)	(0.0017)
Services	0.1044	0.3319	0.1217	0.3462	0.1372	0.3526
	(0.0012)	(0.0025)	(0.0013)	(0.0024)	(0.0013)	(0.0022)
Financial	0.0378	0.0339	0.0373	0.0316	0.0495	0.0412
	(0.0007)	(0.0010)	(0.0007)	(0.0009)	(0.0008)	(0.0009)
Transport/	0.0639	0.0108	0.0650	0.0110	0.0700	0.0125
Communications	(0.0009)	(0.0006)	(0.0009)	(0.0005)	(0.0009)	(0.0005)
Social Services	0.0413	0.2296	0.0409	0.2270	0.0482	0.2294
	(0.0008)	(0.0022)	(0.0008)	(0.0021)	(0.0008)	(0.0020)
Government	0.0703	0.0540	0.0672	0.0560	0.0642	0.0540
	(0.0010)	(0.0038)	(0.0009)	(0.0012)	(0.0009)	(0.0005)
No Signed Labour Card	0.2396	0.2991	0.2074	0.2730	0.2198	0.2883
	(0.0017)	(0.0033)	(0.0015)	(0.0023)	(0.0015)	(0.0021)

Source: computed from PNAD 1988, 1992 and 1998. Standard deviations of the dummy variables are standard deviations of a proportion.

Table 2: Wage Regressions by Gender, 1988, 1992 and 1998

	1988		1992		1998	
Variable:	Men	Women	Men	Women	Men	Women
Illiterate (reference group)	-	-	-	-	-	-
Elementary	0.306	0.327	0.207	0.220	0.184	0.158
	(0.010)**	(0.015)**	(0.011)**	(0.016)**	(0.011)**	(0.017)**
Primary	0.606	0.597	0.445	0.416	0.404	0.338
	(0.012)**	(0.018)**	(0.012)**	(0.018)**	(0.012)**	(0.017)**
Secondary	1.322	1.223	1.051	0.952	0.967	0.850
	(0.014)**	(0.020)**	(0.014)**	(0.020)**	(0.013)**	(0.018)**
Degree	2.193	2.066	1.814	1.618	1.849	1.636
	(0.016)**	(0.022)**	(0.016)**	(0.022)**	(0.015)**	(0.020)**
Postgraduate	2.770	2.592	2.217	1.972	2.324	2.158
	(0.071)**	(0.074)**	(0.049)**	(0.057)**	(0.036)**	(0.039)**
Experience	0.069	0.056	0.052	0.040	0.052	0.037
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Experience squared	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
South East (reference group)	-	-	-	-	-	-
North	0.001	-0.006	-0.132	-0.136	-0.167	-0.151
	(0.012)	(0.016)	(0.013)**	(0.016)**	(0.011)**	(0.014)**
Centre West	0.043	0.072	-0.003	0.015	0.008	-0.012
	(0.010)**	(0.014)**	(0.010)	(0.013)	(0.009)	(0.011)
South	-0.085	-0.043	-0.044	-0.021	-0.046	-0.049
	(0.009)**	(0.012)**	(0.008)**	(0.011)	(0.008)**	(0.010)**
North East	-0.263	-0.430	-0.333	-0.463	-0.334	-0.381
	(0.008)**	(0.011)**	(0.008)**	(0.010)**	(0.007)**	(0.009)**
Rural (reference group)	-	-	-	-	-	-
Metropolitan	0.401	0.622	0.412	0.572	0.380	0.455
	(0.011)**	(0.016)**	(0.011)**	(0.015)**	(0.010)**	(0.013)**
Urban	0.256	0.387	0.273	0.318	0.236	0.222
	(0.010)**	(0.016)**	(0.010)**	(0.015)**	(0.009)**	(0.013)**
White (reference group)	-	-	-	-	-	-
Black	-0.243	-0.180	-0.227	-0.174	-0.253	-0.172
	(0.014)**	(0.018)**	(0.013)**	(0.017)**	(0.011)**	(0.014)**
Mixed	-0.184	-0.165	-0.175	-0.159	-0.193	-0.168
	(0.007)**	(0.010)**	(0.007)**	(0.009)**	(0.006)**	(0.008)**
Agriculture (reference group)	-	-	-	-	-	-
Manufacturing	0.299	-0.221	0.301	-0.160	0.346	-0.034
	(0.011)**	(0.020)**	(0.011)**	(0.019)**	(0.010)**	(0.018)
Construction	0.113	-0.080	0.103	-0.065	0.275	0.305
	(0.012)**	(0.054)	(0.012)**	(0.057)	(0.011)**	(0.041)**
Other Production	0.562	0.243	0.442	0.173	0.438	0.277
	(0.020)**	(0.052)**	(0.020)**	(0.046)**	(0.020)**	(0.042)**

Table 2 (continued)

Retail	0.138	-0.177	0.172	-0.112	0.265	-0.000
	(0.012)**	(0.020)**	(0.011)**	(0.018)**	(0.011)**	(0.017)
Services I	0.025	-0.596	0.093	-0.406	0.207	-0.140
	(0.013)	(0.017)**	(0.012)**	(0.017)**	(0.011)**	(0.016)**
Services II	0.268	-0.110	0.304	-0.074	0.427	0.146
	(0.018)**	(0.027)**	(0.017)**	(0.026)**	(0.015)**	(0.022)**
Transport/Comms	0.332	-0.035	0.357	0.053	0.440	0.234
	(0.015)**	(0.042)	(0.014)**	(0.039)	(0.013)**	(0.033)**
Social Services	0.171	-0.132	0.176	-0.089	0.376	0.138
	(0.018)**	(0.018)**	(0.017)**	(0.017)**	(0.015)**	(0.016)**
Public	0.256	0.017	0.232	0.018	0.497	0.322
	(0.014)**	(0.024)	(0.014)**	(0.022)	(0.013)**	(0.020)**
No Labor Card	-0.371	-0.356	-0.420	-0.376	-0.276	-0.220
	(0.008)**	(0.009)**	(0.007)**	(0.009)**	(0.007)**	(0.008)**
Intercept	-1.310	-1.274	-1.028	-0.879	-0.943	-0.735
	(0.019)**	(0.028)**	(0.018)**	(0.027)**	(0.017)**	(0.025)**
N by gender	65002	35042	68102	38620	74378	45798
N by year	100044		106722		120176	
R-squared	0.49	0.55	0.46	0.49	0.49	0.49

Notes: Standard errors in parentheses. * denotes significant at 5%; ** at 1%. Services I corresponds to the services sector; Services II corresponds to the PNAD classification of auxiliary services of economic activity.
Source: computed from PNAD 1988, 1992 and 1998

Table 3. JMP decomposition

	Year	Total	Observed X's	Observed prices	Gap	Unobserved prices
(1)	1992-88	-0.1026	0.0111	-0.0030	-0.0965	-0.0142
(2)	1998-92	-0.0857	-0.0113	-0.0350	-0.0274	-0.0119
(3)	1998-88	-0.1883	-0.0047	-0.0335	-0.1259	-0.0249

Source: Authors' computations from results reported in Table 2.